**Template | Unit Enhancement**

***EXPLANATION & ARGUMENTATION***

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**Background Information**

**Instructional Materials Title:** Land & Water

**Publication Date:**

**Work Group Participants:** Marcia Ventura, Robyn Horton, Autumn Doss, Heather St. John, Philip Bell

**Date Developed:** August 21, 2013

**High Leverage Lesson (Title and Page Number):**

* Lesson 14: Plants Protecting Sloped Land From Erosion
* SPS Instructional Guide p.27

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**Rationale**

**Why we identified this particular lesson:** Erosion and deposition are key science concepts, and the data table lends itself to the CER science explanation

**Connections to NGSS Practices and WA Science Standards:** [see SPS Instructional Guide]

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***Explanation* Lesson Enhancement**

**Part 1: Lesson Modifications to Lead Up to *Explanation* Experience**

Lesson 14 has a controlled experiment that involves comparison.  The amount of erosion and deposition on a slope covered with vegetation is compared with the amount of erosion and deposition on a slope without vegetation (lesson 4).  (Vegetation could also be removed and run the way it is outlined in the SPS Instructional Guide, time permitting.)  All other variables are kept the same.  The presence of vegetation can inhibit the process of erosion.  The amount of erosion and deposition on a slope covered with vegetation (plants) is less than the amount of erosion and deposition on a slope without vegetation (or removed vegetation).  At the end of this lesson we will have the whole class work together in a Class vs. Teacher discussion.  To help cultivate a discourse of argumentation where students engage in evidence-based reasoning about competing claims, the teacher presents a correct claim with an incorrect reason.  Students as a class discuss and argue their positions citing evidence against the teacher.  The teacher admits/encourages students’ correct claims.

**Part 2: *Explanation* Learning Sequence**

Prior to unit: CER introduction (outside of science, engaging)

Lesson 3: CER partner writing, shared

Lesson 4: 1st CER alone, then opportunities to revise/look at other examples

Lesson 14: final CER Assessment

* Students run experiment, take measurements
* Teacher presents incorrect claim and evidence
* Whole class discussion and argument citing evidence against incorrect teacher claim
* Teacher encourages correct student claims by seeking consensus through whole class discussion about the claims being considered (while considering compelling evidence and reasons)
* Students (using accommodations if needed) write their own CER using the correct claim
* Advanced students can try out rebuttal

**Part 3-A: Describe Assessment Task**

*Include the* ***question****,* ***evidence*** *students will use, and* ***scientific concepts*** *students will use in their reasoning.*

**Question:** What is the effect of vegetation on sloped land on the amount of soil that is eroded and deposited downstream?

**Evidence:** Student observations (qualitative), comparative measurements of sediment in graduated cylinder with and without plants

**Scientific Concepts:** The presence of vegetation inhibits the process of erosion. When humans remove or damage vegetation and leave the land bare, there is more erosion and deposition.

**Part 3-B: Assessment Rubric**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Claim: A statement or conclusion that answers the original question/problem.** | **Evidence: Scientific data that supports the claim. The data need to be appropriate and sufficient to support the claim.** | **Reasoning: A justification that connects the evidence to the claim. It shows why the data count as evidence by using appropriate and sufficient scientific principles.** |
| **1** | Does not make a claim, or makes an inaccurate claim like, “Vegetation doesn’t affect erosion.” | Does not provide evidence, or only provides inappropriate evidence or vague evidence, like, “ | Does not provide reasoning, or only provides inappropriate reasoning like, “ |
| **2** | Makes an accurate but vague claim like, “There is a difference.” | Provides 1 piece of evidence: Student observations (qualitative), depth of stream channel, width of stream channel and possibly using width of deposited soil, length of deposited soil, depth of deposited soil and/or depth of soil collected in cylinder. | Starts to hint/describe the scientific reasoning (vegetation effects on erosion and deposition) but may not be complete or link back to the data. |
| **3** | Makes an accurate and complete claim like, “The vegetation (plants) decreases the amount of erosion and deposition.” | Provides 2 pieces of evidence:  Student observations (qualitative), depth of stream channel, width of stream channel and possibly using width of deposited soil, length of deposited soil, depth of deposited soil and/or depth of soil collected in cylinder. | Accurately describes the scientific reasoning (vegetation effects on erosion and deposition) and how the data connects to it. May hint at comparing the lesson four model with the lesson fourteen model. |
| **4** | Makes an accurate, concise and detailed claim like, “The amount of erosion and deposition on a slope covered with vegetation (plants) is less than the amount of erosion and deposition on a slope without vegetation (or removed vegetation).” | Provides 3 or more pieces of evidence (qualitative and quantitative): Student observations (qualitative), depth of stream channel, width of stream channel and possibly using width of deposited soil, length of deposited soil, depth of deposited soil and/or depth of soil collected in cylinder. | Completely describes and links the scientific reasoning to the data (vegetation effects on erosion and deposition) and uses at least one scientific term. Comparing the model without vegetation to the vegetation model. |

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**Additional Information**

NOTES

· Information that will be useful when teaching this lesson

- Resources that will be useful

- Scaffolds that students will use